

Remarks/Arguments:

The present invention relates to a technique for impulse communication. Specifically, multiple narrow band subcarrier signals are multiplexed in frequency in a frequency range of the impulse modulated signal.

On page 2, the Official Action rejects claim 1 under 35 U.S.C. 112 as failing to comply with the written description requirement. The Examiner states that the recitation of "*at least two of the subcarriers including the same data*" is not supported in the specification. Applicants, however, respectfully disagree. This feature is supported on page 15, lines 19 and 20 of the specification ("*the subscribers are attached with the same symbol*"). The portion of the specification which recites "subscribers" is a typo, and should actually read "subcarriers." Support for this typo is found in Applicants' PCT application. Thus, Applicants have amended page 15 of the specification accordingly. No new matter has been added.

On page 3, the Official Action rejects claim 1 under 35 U.S.C. 112 as being indefinite. Specifically, the Examiner states that the recitation of "transmission" in line 14 of claim 1 should recite "transmission signals." Applicants agree with the Examiner, and have amended claim 1 as suggested.

On page 4, the Official Action rejects claims 1, 6-8, 15-22, 24, 29 and 31 under 35 U.S.C. 103(a) as being unpatentable over Fullerton (U.S. Patent No. 5,677,927) in view of Rouquette (U.S. Patent No. 7,308,035). It is respectfully submitted, however, that the claims are patentable over the art of record for at least the reasons set forth below.

Fullerton teaches an ultrawide-band communication system by utilizing subcarriers in an impulse modulation system. Specifically, the subcarriers are separated into individual independent channels. Rouquette teaches a diversity transmission system that comprises multiple antennas. Specifically, Rouquette transmits data over different bands at different points in time.

Applicants' invention, as recited by claim 1, includes a feature which is neither disclosed nor suggested by the art of record, namely:

...a modulation part for generating a plurality of subcarriers modulation signals, at least two of the subcarriers including the same data, using an impulse modulation signal...

...a filter section for outputting a plurality of transmission signals in a frequency range of the frequency band of the impulse modulation signal...

Claim 1 relates to the impulse modulation system where the impulse modulation is broken into the multiple subcarriers. Specifically, the subcarriers have the same data and are transmitted in a frequency range of the frequency band of the impulse modulation signal. This configuration allows corrupted subcarriers to be filtered out and non-corrupted subcarriers to be demodulated. Support for this feature is found in the originally filed application in at least Fig. 12 and on page 7, line 9 - page 8, line 12 of the specification. No new matter has been added.

Fullerton discloses an ultrawide-band transmission that is generated by impulse modulation. Specifically, Fullerton turns the impulse signal into multiple channels by use of subcarriers. Specifically, by using separate subcarriers at individual channels, communication over multiple independent channels is possible. This is supported in at least Fullerton's abstract (*"Subcarriers of different frequencies or waveforms can be used to add channelization of impulse radio signals. Thus, an impulse radio link can communicate many independent channels simultaneously by employing different subcarriers for each channel"*). Fullerton's system, however, is a broadband system that does not band limit the subcarriers in the frequency range of the impulse modulation signal. This is shown in Fullerton's transmission energy spectrum in Fig. 4 where the signals are not band limited. Fullerton goes on to teach that different data sources are being modulated with multiple subcarriers in Col. 18, lines 26-44 (*"voice information source ... digital data source ... digital control information source"*). Fullerton, however, does not teach a filter section that outputs a plurality of subcarriers that are in a frequency range of the frequency band of the impulse modulation signal (band limited).

On page 5, the Official Action states that Fullerton does not teach multiple subcarriers including the same data in the transmission signal. The Official Action goes on to state that Rouquette in Col. 1, lines 39-48 suggests multiple subcarriers having the same data (*"where the same data is transmitted over different physical paths interleaved in time in particular over different transmit and/or receiving antenna elements"*). Specifically, Rouquette features transmitting these signals from different transmit antennas at different times in different bands. Rouquette, however, does not teach that the plurality of subcarriers are filtered by a filter section in a frequency range of an impulse modulated signal.

Applicants' claim 1 is different than Fullerton and Rouquette, because subcarriers are modulated with the same data and a filter section band limits these transmission signals in a frequency range that is in the frequency band of the impulse modulated signal ("*a modulation part for generating a plurality of subcarriers modulation signals, at least two of the subcarriers including the same data, using an impulse modulation signal ... a filter section for outputting a plurality of transmission signals in a frequency range of the frequency band of the impulse modulation signal*"). Support for the band limiting filter section can be found on at least page 14, lines 23-27 ("*the signal outputted from the transmission section 205 is band-limited ... the filter section 250 has a pass characteristic assumably configured as shown in Fig. 3*"). Specifically, as shown in Fig. 3, Applicants have seven subcarriers that are multiplexed in frequency and band-limited. The subcarriers are generated within a specific frequency band as shown as the dashed line in Fig. 3. By band-limiting the subcarriers in the frequency band of the impulse modulated signal, the system can sustain reliable communication even if an interfering wave exists in the band. Certain subcarriers may be excluded when they are corrupted by an interfering wave as shown in Fig. 12. Specifically, in Fig. 12, subcarriers F4 and F5 are excluded in the demodulation since they are corrupted by interfering wave 1202. The remaining subcarriers are used to correctly demodulate the data.

Applicants include the feature of "*a modulation part for generating a plurality of subcarriers modulation signals, at least two of the subcarriers including the same data, using an impulse modulation signal ... a filter section for outputting a plurality of transmission signals in a frequency range of the frequency band of the impulse modulation signal*", that the following advantages are achieved. An advantage is the ability to utilize the subcarriers that are not deteriorated due to interfering waves and filtering those carrier waves which are deteriorated by interfering waves. This is accomplished by band-limiting the subcarriers in a frequency band of the impulse modulated signal. Accordingly, for the reasons set forth above, claim 1 is patentable over the art of record.

The Examiner rejects some other independent claims based on combinations of Fullerton, Rouquette, Aslanis (U.S. Publication No. 2002/0094049), Fullerton (U.S. Patent No. 5,687,169) and Toshimitsu (U.S. Patent No. 6,735,256). Neither of these references, however, suggest a filter section that band-limits the plurality of subcarriers in a frequency range of the impulse modulated signal as currently recited in Applicants' claim 1. Thus, neither of these references nor any of their combinations suggest the features in Applicants' claim 1.

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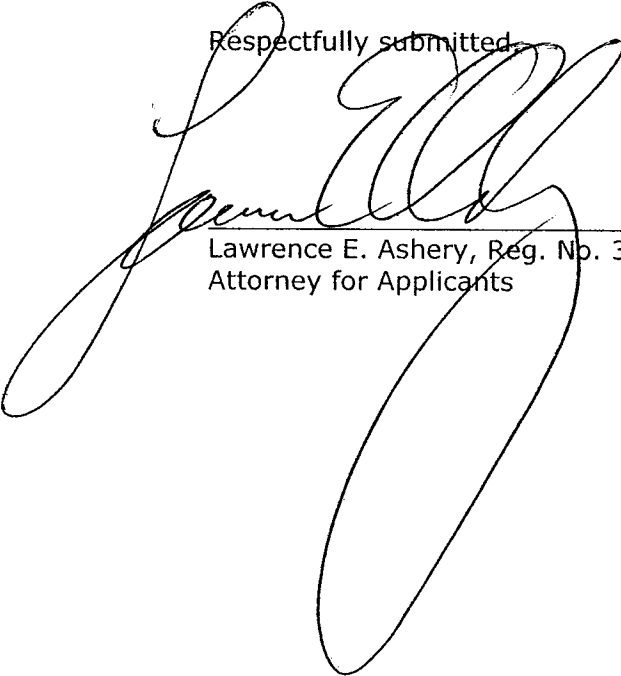
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Independent claim 32 has been similarly amended to claim 1, thus, claim 32 is also patentable over the art of record for the reasons set forth above.

Dependent claims 2-31 and 33-35 include all of the features of claims from which they depend. Thus, these claims are also patentable over the art of record for at least the reasons set forth above.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance which action is respectfully requested.

Respectfully submitted,



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